

Development of ADM-Aeolus portable level 2B wind retrieval software



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Summary

The development of ADM-Aeolus L2B wind processing software is described and some first simulated results are presented.

1 Introduction

The Atmospheric Dynamics Mission, named ADM-Aeolus is due to be launched in 2009 and is flying the first Doppler wind lidar in space. This will enable measuring profiles of wind from space for the first time, aiding atmospheric flow analysis for climate studies and NWP. In preparation for the processing of the data specialised software is being developed. The instrument features a smallband and a broadband frequency channel for detecting the Doppler shifts (HLOS) of particles (aerosol, cloud) and molecules respectively. For a description of the instrument see the poster by [Anne Grete Straume-Lindner](#).

2 Software: processing algorithms

Level 2B processing (L2Bp) will allow to:

- remove cross-talk between both channels
- classify atmospheric profiles accumulated over small distances (1 to 3.5 km)
- accumulate the profiles of each class within the 50 km observation track.
- calculate HLOS wind from both Mie and Rayleigh separately

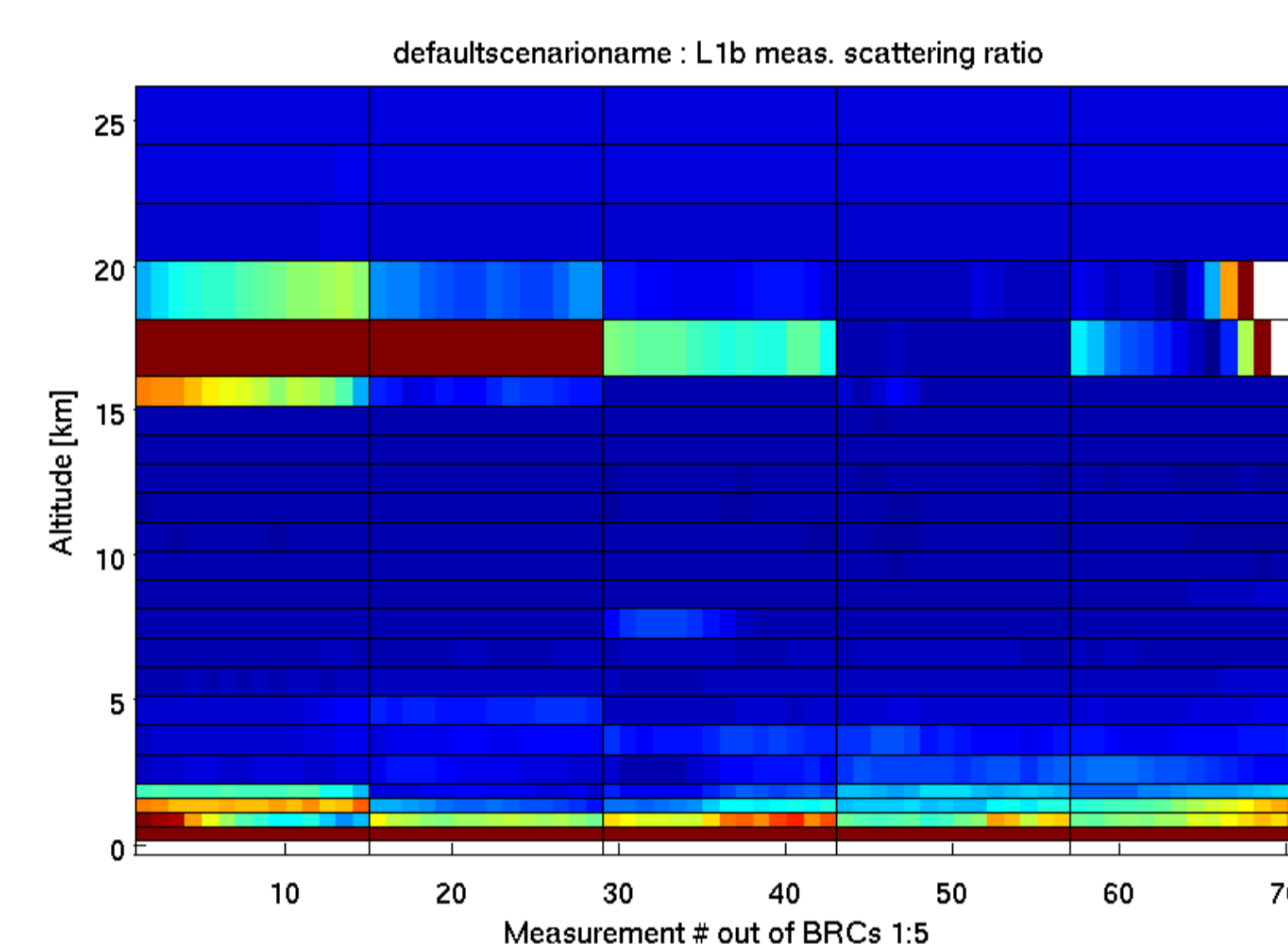
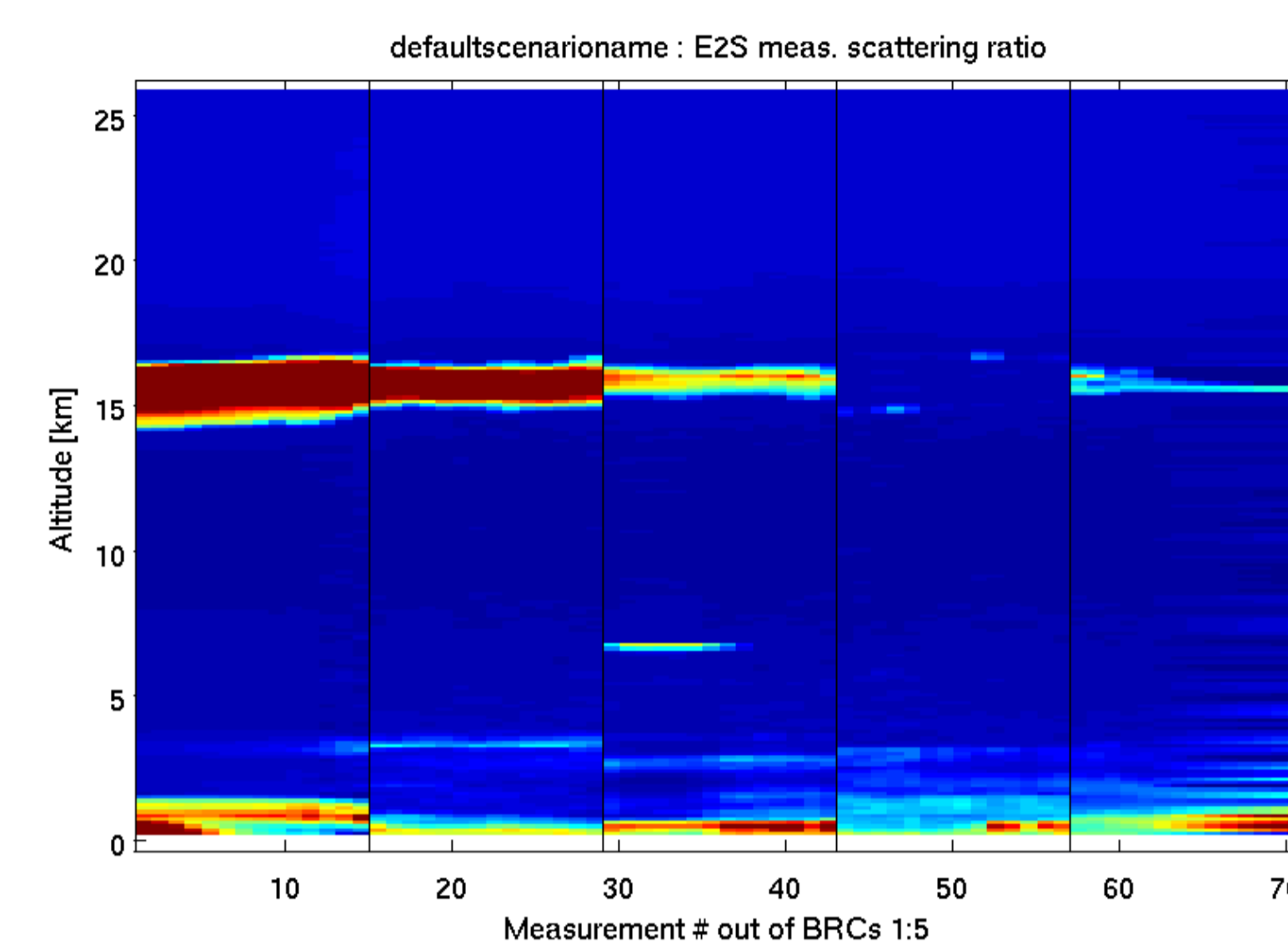
3 Software: implementation

- strict Fortran90, to ensure easy portability.
- external libraries: EE_CFI and BUFR
- makefiles for compilation and unit testing
- unit testing uses a custom made “diff” tool
- external parameter file for configuration
- setup allows inclusion into integrated forecasting systems (IFS).
- fileformat: Earth Explorer. BUFR to be added.

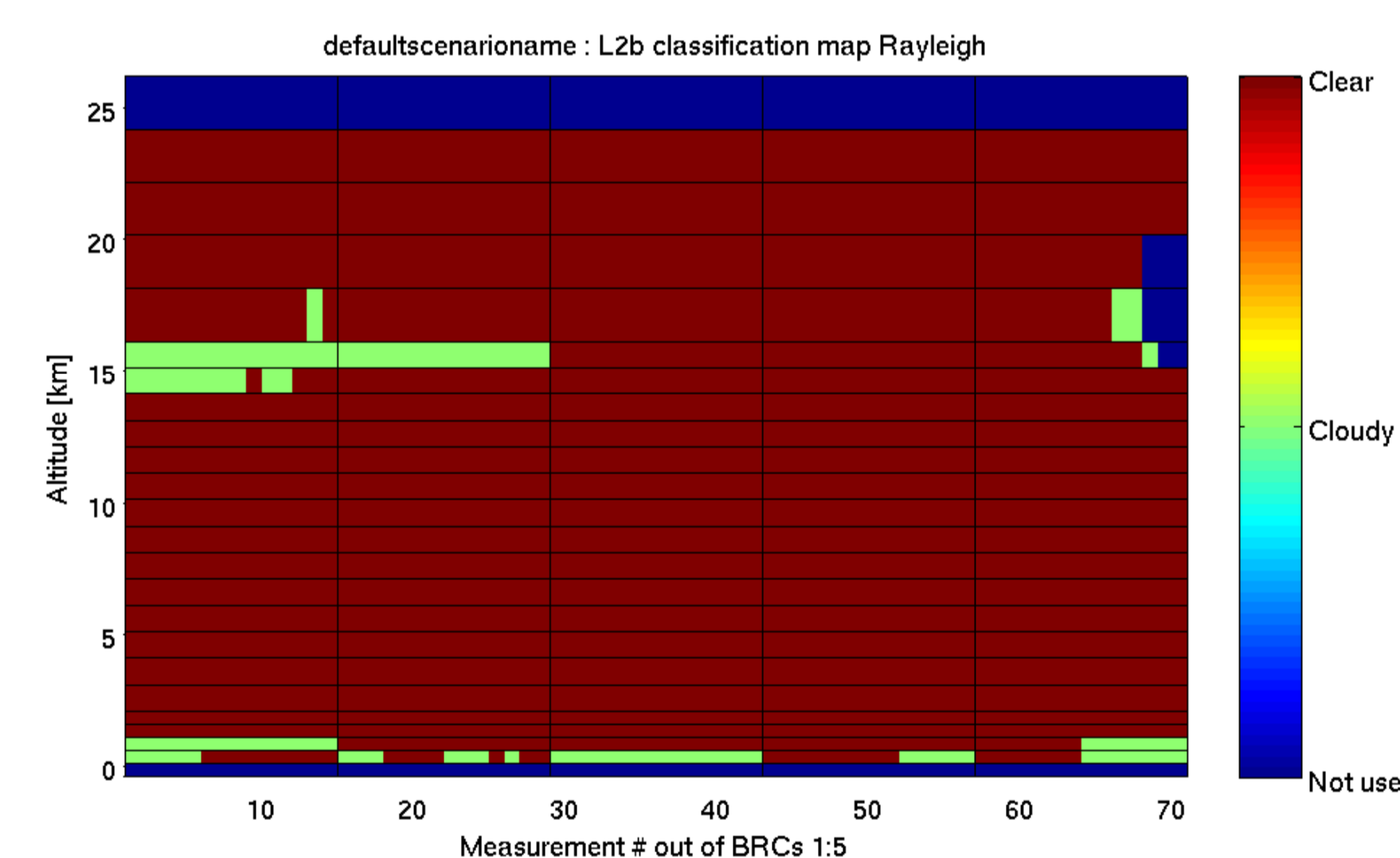
4 Software: testing

- automatic unit testing on all modules
- manual validation testing
- scientific testing of the algorithms, often taken out of L2Bp context.
- “realistic testing” on simulated data (E2S).

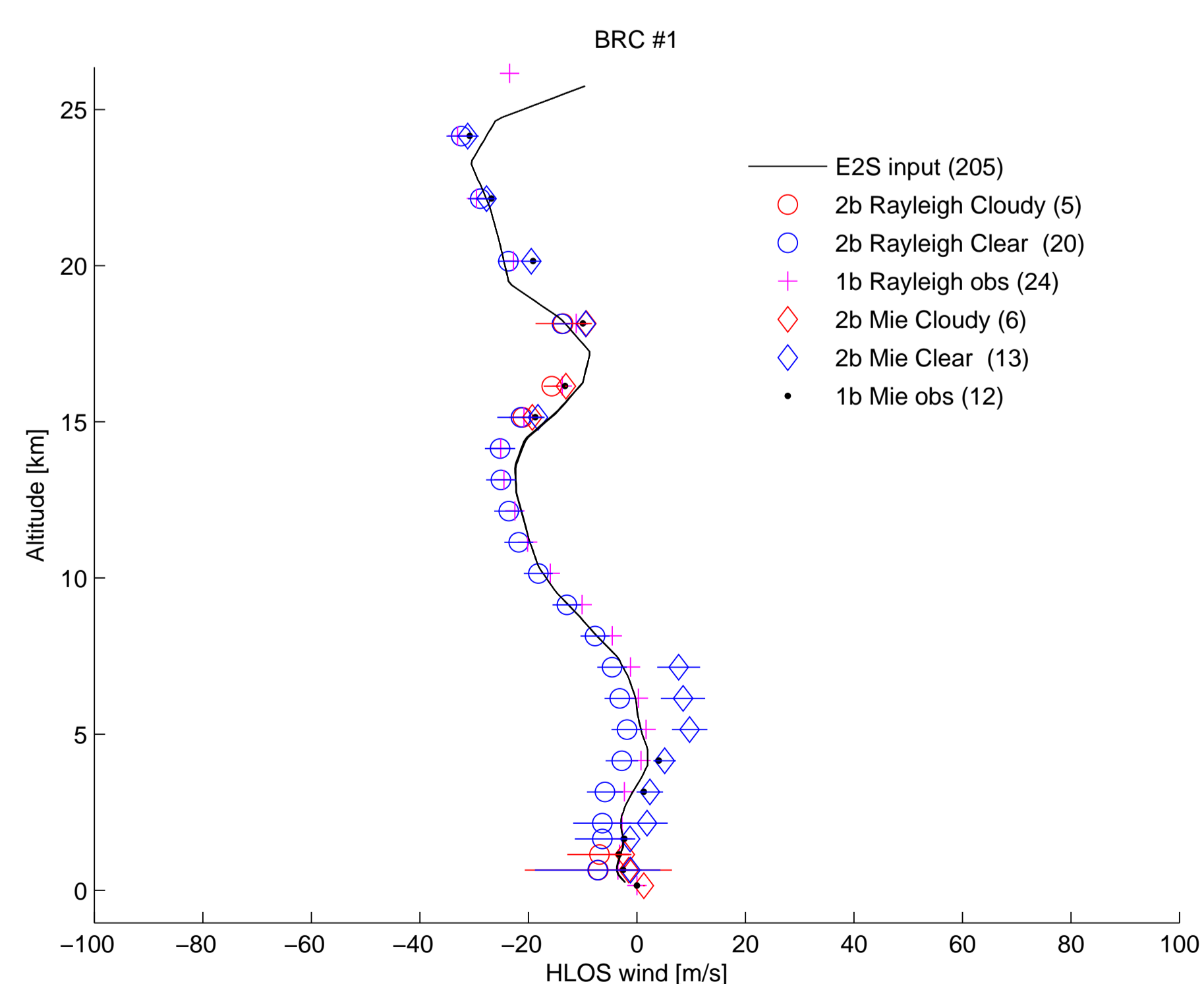
5 First test results



Scattering ratio based on LITE data, is used as input to the E2S satellite simulator, and scattering ratio found by the L1B processing which will be used as input for the L2Bp.



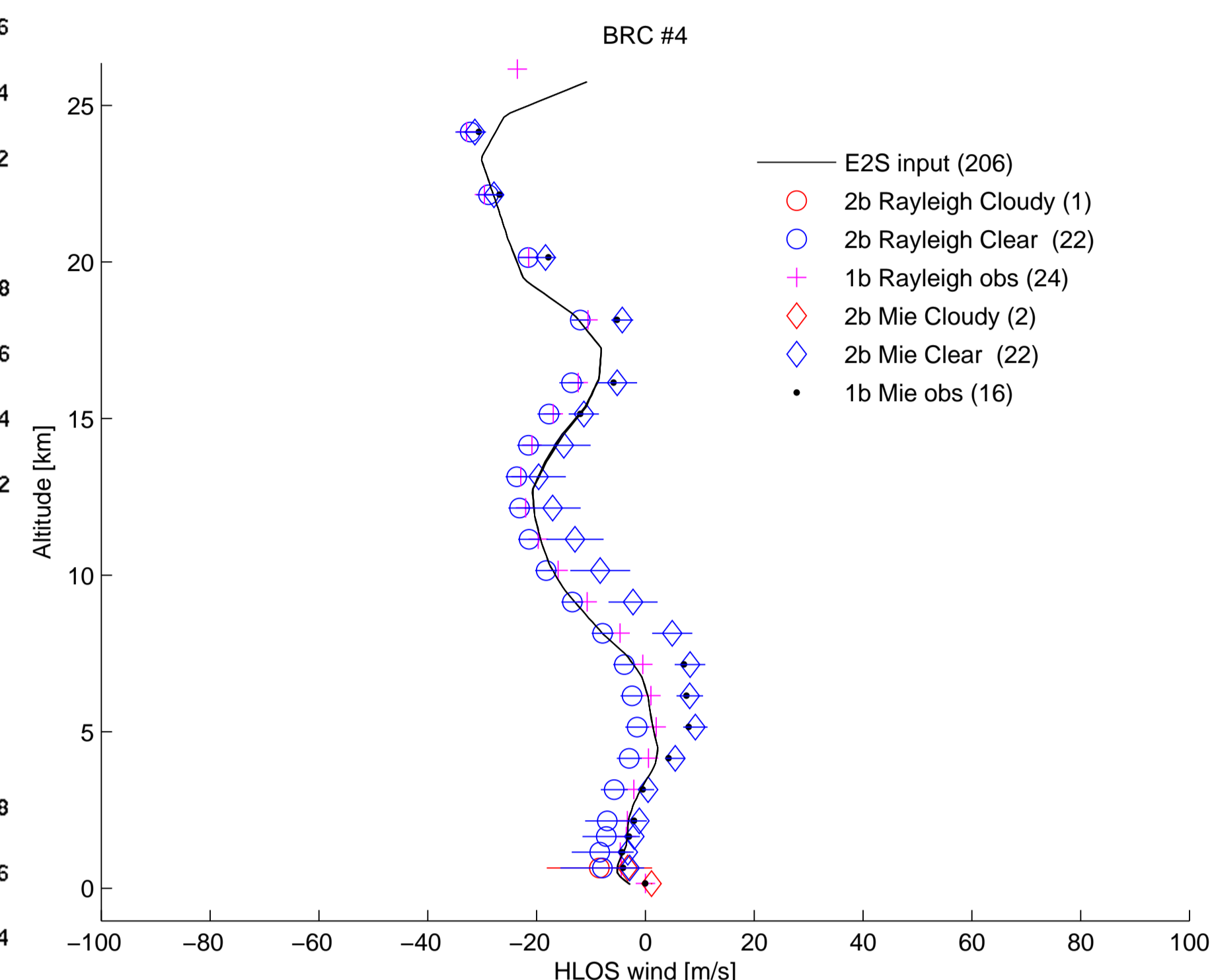
Classification used by the L2Bp software, based on setting a threshold on the scattering ratio found by the L1B processing.



Horizontally projected line-of-sight wind component found by the L1B and L2B processing software for BRC 1.

A first test scene based on collocated LITE

(Lidar-In-Space-Technology) and ECMWF data (tropical cirrus case above Indonesia, dated 19940910). No instrument noise has been added yet.



Horizontally projected line-of-sight wind component found by the L1B and L2B processing software for BRC 4.

6 Conclusion

- implementation in progress
- we plan to add optical properties calculation for improved optical classification
- added value of L2Bp to be demonstrated
- much more testing needed

7 See also

ADM Aeolus conference contributions:

- “Assessment of post-Aeolus Doppler wind lidar scenarios”, by [Ad Stoffelen](#), KNMI, tuesday 12:05h.
- “An improved forecast of the 1999 Christmas storm “Martin” - A cycled SOSE experiment”, by [Gert-Jan Marseille](#), KNMI, wednesday, 09:30h.
- poster: “ADM-Aeolus - ESA’s spaceborne wind profiling LIDAR”, by [Anne Grete Straume-Lindner](#), ESA/ESTEC, session 1, set 1, monday/tuesday.
- poster: “Doppler wind Lidar measurement scenarios in the Tropics”, by [Nedjeljka Zagar](#), NCAR, joint poster session 1 & 2, set 1, monday/tuesday.

Further reference:

- “The ADM-Aeolus wind retrieval algorithms”, by David G.H. Tan, Erik Andersson, Jos de Kloe, Gert-Jan Marseille, Ad Stoffelen, Paul Poli, Marie-Laure Denneulin, Alain Dabas, Dorit Huber, Oliver Reitebuch, Pierre Flamant, Olivier Le Rille and Herbert Nett, [Accepted for publication in Tellus 60A, 2008, special edition on ADM-Aeolus.](#)

Website:

- <http://www.esa.int/esaLP/LPadmaeolus.html>